

# Ohio Agricultural Experiment Station.

---

## BULLETIN 104.

---

*WOOSTER, OHIO, MARCH, 1899.*

---

### FURTHER STUDIES UPON SPRAYING PEACH TREES AND UPON DISEASES OF THE PEACH.

---

The Bulletins of this Station are sent to all residents of the State who request them.  
All correspondence should be addressed to

EXPERIMENT STATION, WOOSTER, OHIO.

---

COLUMBUS, OHIO  
FRED J. HEER, STATE PRINTER  
1899

1 Ex. Sta. Bul. 104.

The Ohio State University



3 6267 01222721 4

# ORGANIZATION OF THE OHIO AGRICULTURAL EXPERIMENT STATION.

## BOARD OF CONTROL.

SETH H. ELLIS.....	Springboro
R. H. WARDER.....	North Bend
J. T. ROBINSON.....	Rockaway
THE GOVERNOR OF THE STATE	} ..... <i>Ex officio</i>
THE DIRECTOR OF THE STATION	

## OFFICERS OF THE BOARD.

SETH H. ELLIS.....	President
R. H. WARDER.....	Secretary
PERCY A. HINMAN.....	Treasurer

## STATION STAFF.

CHARLES E. THORNE.....	Wooster	.....	Director
WILLIAM J. GREEN.....	"	.....	Horticulturist and Vice-Director
J. FREMONT HICKMAN, M. A. S....	"	.....	Agriculturist
FRANCIS M. WEBSTER, M. S. ....	"	.....	Entomologist
AUGUSTINE D. SELBY, B. SC.....	"	.....	Botanist and Chemist
CHARLES W. MALLY, M. SC.....	"	.....	Assistant Entomologist
JOSEPH W. T. DUVEL, B. SC.....	"	.....	Assistant Botanist
PERCY A. HINMAN.....	"	.....	Bursar
WILLIAM HOLMES.....	"	.....	Foreman of Farm
CHARLES A. PATTON.....	"	.....	Ass't Foreman and Meteorologist
ANNIE B. AYRES.....	"	.....	Mailing Clerk
CARY WELTY.....	"	.....	Mechanic
W. E. BONTRAGER.....	"	.....	Foreman of Greenhouses
EDWARD MOHN.....	Strongsville	.....	Supt. Northeastern Sub-Station
LEWIS SCHULTZ.....	Neapolis	.....	Supt. Northwestern Sub-Station

The Bulletins of this Station are issued at irregular intervals. They are paged consecutively, and an index is included with the Annual Report, which constitutes the final number of each yearly volume.

BULLETIN

OF THE

Ohio Agricultural Experiment Station.

---

NUMBER 104.

MARCH, 1899.

---

FURTHER STUDIES UPON SPRAYING PEACH TREES AND  
UPON DISEASES OF THE PEACH.

BY A. D. SELBY.

ADDITIONAL RESULTS OF SPRAYING FOR LEAF CURL.

The experiments of this Station, published in Bulletin 92, gave the results of the successful application of Bordeaux mixture in the control of the leaf curl fungus of the peach, *Eroascus deformans* B. These trials, as therein stated, were made by the Station in coöperation with Mr. Wm. Miller, of Gypsum, Ottawa county. Unfortunately, the absence of a crop of fruit during 1897, the last season of these experiments, left the questions pertaining to loss of yield by leaf curl still unsettled. Other urgent demands upon the time and resources of the Station Botanist made it necessary to suspend spraying work at Gypsum. Mr. Miller, however, being convinced of the good effects of this treatment, determined to continue the work and thoughtfully adapted it to yield comparisons of a similar sort to those made in the Station's experiments.

The season of 1898 was one of bountiful peach yields in Ohio, as well as one of abundant leaf curl, although all "curl" months except April alone were above the normal in mean temperature.

The conditions of the previous season had left a bountiful supply of the fungus and one bad month was enough to make it destructive. By this combination of both peach crop and curl development Mr. Miller has obtained results of great value, which he is pleased to have published in connection with the former ones, on the same orchards and on the same variety, Elberta. Other peach growers, profiting by the results of the previous year, have also added to our experience in this line. Growers will now be able to perceive more clearly the disastrous losses from leaf curl, if unchecked, as well as the good effects of the spray treatment, when made at the proper time.

The presence of San José (pronounced, hozay) scale upon parts of Catawba Island, Ottawa county, a few miles north of Gypsum, led to the use of whale oil soap solution for this scale in 1897. The trees thus treated were observed to be comparatively free from leaf curl; consequently, some growers have experimented with whale oil soap for curl prevention. Progress seems to have come from the trials of the season.

Mr. Miller has also continued certain spraying experiments with Bordeaux mixture, which were inaugurated in 1895 and 1896 respectively, upon Salway trees in his orchards, to prevent scab of this variety; those in the North Orchard were begun in 1895 and in the South Orchard in 1896. The results of these before mentioned experiments yield no addition to the results previously published.

#### LEAF CURL PREVENTION IN 1898.

By reference to Bulletin 92, Page 241, Diagram "A", and Page 242, Diagram "B", the plans of Mr. Miller's orchards will be made clear. These orchards are again under consideration in the present spraying discussions.

By further reference to the treatments applied in 1895 to 1897, on Pages 243 and 244 inclusive of same bulletin, the reader will apprehend the relation of previous sprayings to those of 1898.

First as to the South Orchard, Diagram "A", as above: —

The long rows of the Elberta variety, extending from north to south, had received somewhat different treatments in the preceding years, some of these having been sprayed while others were left unsprayed; also there was difference in the number and time of the spraying given the treated rows. Accordingly, to check against all this work, about four transverse, or east and west rows, near the middle of this section, were left unsprayed by Mr. Miller; all the others of this variety, Elberta, were sprayed April 12 and May 30 with stronger Bordeaux mixture before blossoms opened, and again May 17, with the weaker mixture, after the calyx had dropped from the fruit. The effect of the spraying was most marked, as will be seen by a glance at photographic plate representations.

---

#### EXPLANATION OF PLATES.

Plate I. Elberta Peach tree, 9 years old, unsprayed. This tree and others in background have scarcely enough leaves remaining to cast shadows; no fruit left except occasionally a half-dozen peaches to a tree. Photographed June 11, 1898, Row 7, tree 32, Wm. Miller's South Orchard, Gypsum, O.

Plate II. Elberta Peach tree, 9 years old, sprayed three times; Sprayed trees in background. This tree and others included have a good crop of fruit. Photographed June 11, 1898, Row 7, Tree 28, of same Orchard as shown in Plate I. These trees were sprayed twice before the blossoms opened, once April 12 and again April 30; the latter as buds were swelling. They were also sprayed once afterwards on May 17, by Mr. Miller.

Both from photographs made by the writer.

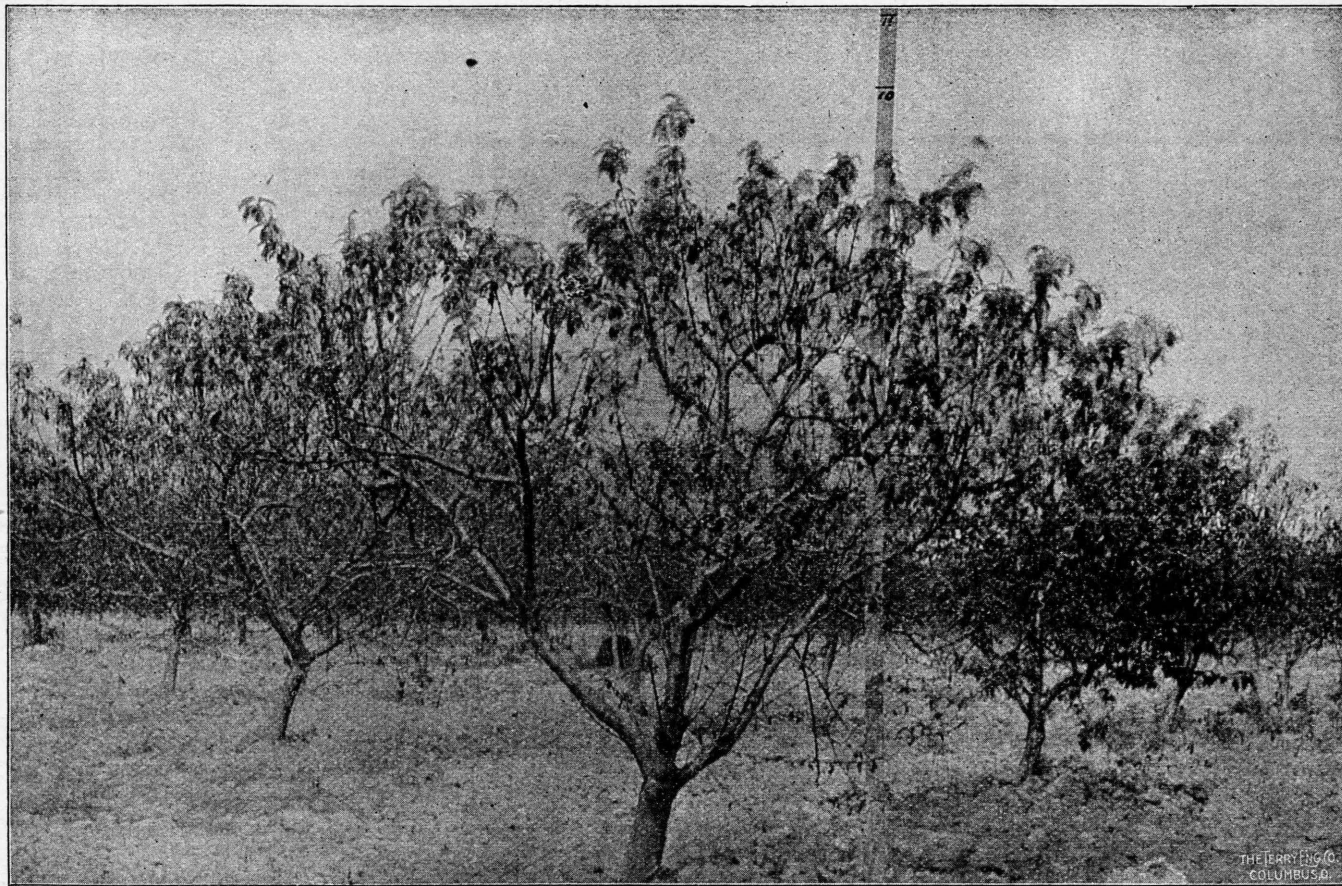
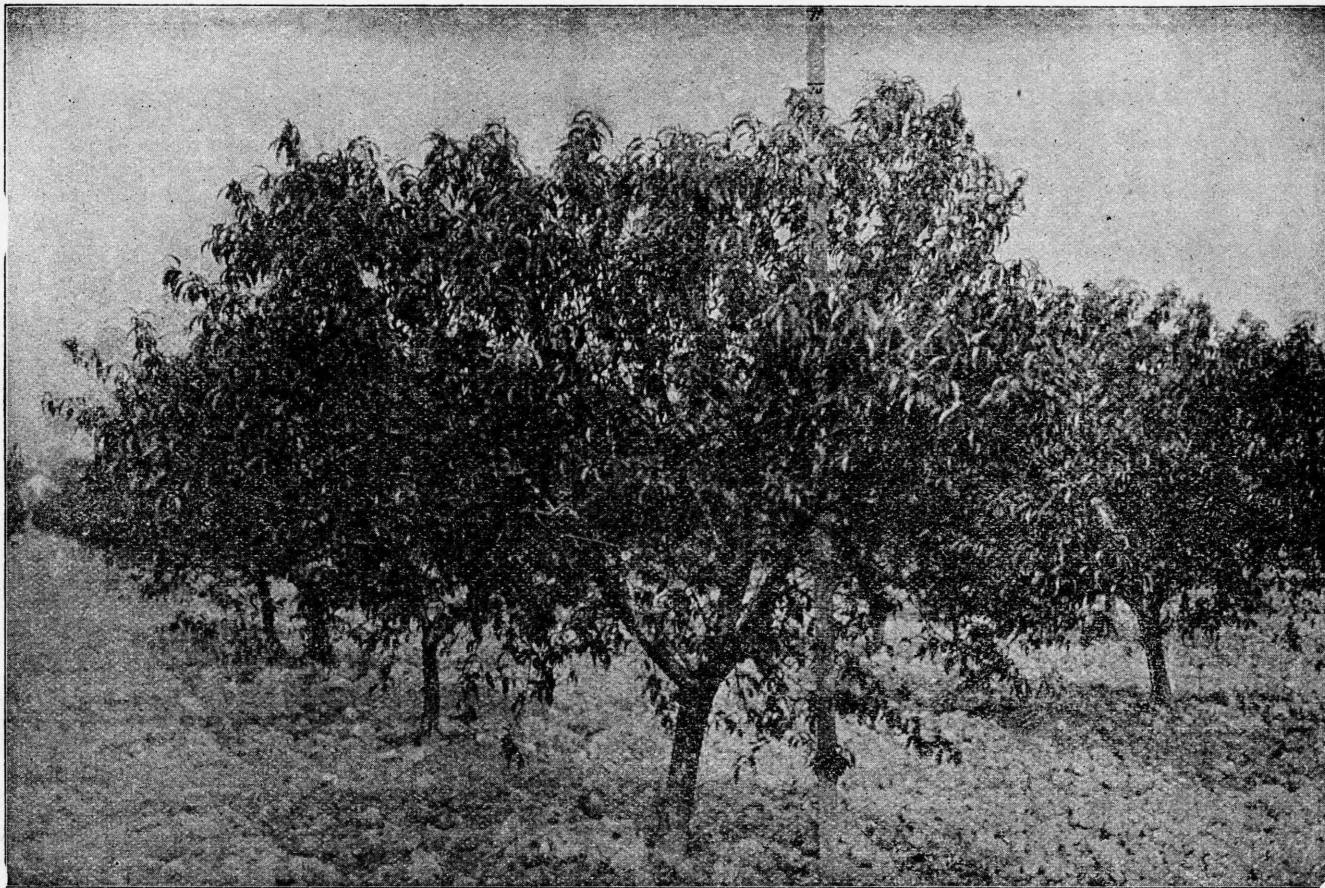


Plate I. Elberta peach tree, 9 years old — Unsprayed.

This page intentionally blank.



(205)

Plate II. Elberta peach tree, 9 years old — Sprayed.

This page intentionally blank.



of a typical sprayed and a typical unsprayed tree of same age, in the same row, Number 7, of this orchard. The photographs were taken June 11 and show all the leaf story, though they do not disclose the fine peach crop on the sprayed tree of Plate II.

Younger unsprayed trees, or replants in this orchard, gave a light picking of peaches, while trees like that photographed for Plate I gave little or no fruit at all. In this respect, the statement of Mr. Miller and Mr. Britton on page 210, relating to the North Orchard and from slightly younger trees, will doubtless apply to all the trees of the South Orchard of the age of those figured with, if any deviation, a more favorable showing respecting the profit of spraying for leaf curl. The photographs in this orchard (North) differed only in unequal quality of photography and not in conditions shown.

#### CUMULATIVE EFFECTS ON LEAF CURL NOT IMPORTANT IN 1898.

In the bulletin before quoted it was pointed out that spraying results showed cumulative benefits; thus the good effects of treatment in 1896 were again added to in 1897. (See Page 254, Bulletin 92.) In 1898, on the other hand, possibly by reason of the abundant supply of the mycelium of the leaf curl fungus in all rows, the differences were much less marked or altogether obscured. Thus, while in 1897 Row 16, South Orchard, Elberta, had 88 per cent. of curled leaves, June 18, against 7 per cent. on Row 13, in 1898, May 19, the writer estimated the amounts on both sprayed and unsprayed sections of these two rows as practically identical. In fact my notes show an estimate of 50 per cent. and 50 per cent. respectively on sprayed trees of both rows and 80 and 85 per cent. of curled leaves upon the unsprayed trees of these rows on that date. In the latter figures 85 refers to Row 16.

Under other circumstances it is quite possible that the cumulative effects upon the crops might have been of very great value. Writing under date of April 29th Mr. Miller states:—

"I notice that the sprayed peach trees in both South and North orchards show a much greater number of blossoms than the unsprayed. While there are enough blossoms on the unsprayed some of them have no surplus. Row 16, South, has the lightest bloom there; not 50 per cent. of that on best rows. North, the difference is equally marked."

Notes made at that date by Mr. Miller show a marked gradation in the number of blossoms. These stood in a very close inverse relation to the amounts of leaf curl in 1897, which have already been referred to, and back of that directly to the treatment given to these trees in the years of the experiments.

The fruit yields have been studied to disclose, if existing, any variation in the crops: Rows 5, 9, 10, 12, 13, 14, 15, and 16, of this orchard, gave on sprayed trees, an average yield of 1.36 bushels per tree. The variations in yield are from 1.06 bushels per tree on Row 9, to 2 bushels

on Row 10; Row 14 gave 1.3 bushels per tree and Row 16 gave 1.36 bushels. While interesting, the results fail to show uniform increase of yields because of past treatments.

EARLY OR LATE SPRAYING — BORDEAUX MIXTURE VS. WHALE OIL SOAP.

It will be observed, from the detailed description of Plate II, that Mr. Miller made two applications of Bordeaux mixture before the blossoms opened; the first, two weeks before, and the other just previous to the flowering of the trees. A third was made after the calyx had fallen. Of these applications, the first was thought to be the most effective, although the difference was not marked between the trees receiving one and those receiving two sprayings, before blossoming; the early or first single application in this case, apparently whether made two weeks before blossoming, or just before, was the most effectual. The application made after blossoming had scarcely an appreciable effect upon the leaf curl. If further experiment shall show that the early application of the Bordeaux mixture in March, or even in the fall previous, as reported in correspondence by Professor Taft, of the Michigan Experiment Station, has an equally beneficial effect as if applied when the buds are swelling, it will be in itself a great advantage, because of the less urgent labor calls at those seasons. The results of a single season can scarcely as yet be taken to have the desired certainty, and it still appears advisable to make an application just before blossoming, whether or not the earlier one has been made. Spraying after blossoming is not required for leaf curl, though essential to be made two or three times for pustular spot, which was prevalent on the peaches from these trees at Gypsum in 1898. The results for pustular spot, published in the earlier bulletin, require no modification as yet.

In July, 1897, Mr. E. F. Pierce, one of the fruit commissioners who had been appointed in Catawba Island to follow up the outbreak of San José scale during that season, wrote me to the effect that spraying with whale oil soap had apparently been a means of preventing the leaf curl. Upon visiting this gentleman in 1898 he referred me to Messrs. Henry Rofkar and W. V. Latham & Son, who had been making certain experiments. These gentlemen were requested by letter to give the results of their trials, which they very kindly did. Their statements are embodied in the following letters:—

Catawba Island, O., October 24, 1898.

Prof. A. D. Selby,

Dear Sir:—Your favor of October 21, in relation to spraying for curl leaf on peach trees, is received.

As you know, we found in the winter of '96-97, that we had the San José scale in our neighborhood, and were compelled to spray with solution of whale oil soap, 2 lb. per gallon; and we found later, that the portion thus sprayed was entirely free of curl leaf, and other trees near by not sprayed were badly affected. Last spring we sprayed again for scale, and I had a block of Old Mixon

and Stump the World, that had always been badly affected by curl leaf, sprayed with the solution of a strength of 1 lb. to a gallon. That block hardly had a sign of curl leaf; set and matured a fair crop of peaches; the foliage was fine and thrifty. One row of this block was left untreated, for the purpose of testing the effect, and that row turned out just as before — curl leaf bad, fruit mostly dropped off, foliage scant and sickly.

Another fact was proved here this season: that peach trees will stand a spray of the soap solution 2 lbs. per gallon without injury to the crop, if applied 8 to 10 days previous to the time that the blossoms open, but if the spray is put on early — in February or March — the buds will be about all destroyed.

One of our neighbors, Mr. Latham, has also used a full strength Bordeaux mixture against curl leaf, applied before buds open, and that also seemed a complete success; the difference showed at a good distance between the trees sprayed and unsprayed.

Yours respectfully,

HENRY ROFKAR.

Catawba Island, O., Oct. 26, 1898.

"Prof. A. D. Selby, Wooster, Ohio.

Dear Sir: — In reply to your inquiry of 21st we enclose copy of experiments, and results of same. We shall experiment more with the soap next spring and think we can get better results than with the Bordeaux, although it is a very expensive preparation to use.

Where we used the soap for scale, there was no sign of curl leaf and trees are in fine shape for a crop next year. This spraying was mostly done in early March, and was a solution of 2 pounds to a gallon of water. Any further questions will be gladly answered.

Yours truly,

W. V. LATHAM & SON."

#### DETAILS OF EXPERIMENTS.

##### *Crawford's Late.*

"Experiment No. 1: — April 8, '98. Sprayed six rows Crawford's Late before blossoms opened; leaves just showing; Bordeaux solution, 4 & 4 to 50 water. Weather cool and dry for about ten days.

Results: — No curl leaf; good crop, fine peaches. Trees bushy and full of new wood for next season. This took in north half of orchard.

Experiment No. 2: — May 13, '98. Sprayed six south rows C. Late (or south half of above mentioned orchard). Blossoms fallen; leaves about half grown and badly curled; solution, Bordeaux, 3 vitriol, 4 lime.

Results: — Trees full of dead wood and several died; fruit fine but scarce; will take another year to put trees in shape for good crop. This spraying should have been done about May 4th, but was put off on account of rainy weather. Cannot tell what results would be, but in my opinion one gallon of solution used just as the leaf bud is bursting is worth more for curl leaf than a barrel full at any later period.

The experiments below were on a small Elberta orchard, 5 rows running north and south, 14 trees to row, 7 years old.

Experiment No. 3: — April 8, '98. Sprayed two west rows Elbertas; Bordeaux, 4 & 4, leaf buds just bursting.

Results: — A partial cure for curl leaf; heavy crop, fine peaches; trees in good shape for crop next season; a little dead wood.

Experiment No. 4: — April 11, '98. Sprayed two east rows Elbertas; whale-oil soap  $\frac{1}{2}$  lb. to gallon of water; leaves about same as above.

Results: — A little more curl leaf than on two west rows, but enough foliage left to hold *full* crop of fruit; trees in fair shape for crop next season, but have a little more dead wood than two west rows.

The middle row was sprayed with Bordeaux after the blossoms fell, May 13, and the entire row did not produce as much fruit as any single tree on the other four rows.

I have experimented with a good many other solutions, but enclosed are the best results.

Will you kindly state when the spraying should be done for the pustular spot? I intend to experiment on that and would like to have some guide as a starter.

Yours respectfully,

F. S. LATHAM."

The work of each of these orchards is clearly stated and requires no further comment. The dead wood mentioned by Mr. Latham consists of twigs killed by the leaf curl fungus.

#### DOES IT PAY TO SPRAY PEACH TREES FOR LEAF CURL?

The following graphic statement was prepared by Mr. Jno. C. Britton, formerly with this department, who was aiding Mr. Miller in fruit harvest:

#### SOME RESULTS OF SPRAYING IN THE NORTH ELBERTA ORCHARD OF WM. MILLER.

Number trees unsprayed.....	165.
Number trees sprayed (yield counted).....	119.
Number bushels on unsprayed trees.....	11.
Number bushels on sprayed trees.....	143.
Number bushels per tree on unsprayed trees.....	0.066
Number bushels per tree on sprayed trees.....	1.21
Number bushels per tree gained by spraying.....	1.144
Total bushels lost by not spraying.....	186.45
Average price per bushel.....	\$1.50
Dollars, gross, lost by not spraying (165 trees).....	\$279.67

(See also Thirty-second Report, 1898, Ohio State Horticultural Society, Page 13. The sprayed and unsprayed trees are adjacent.)

As has been already stated, the yield from untreated trees in South Orchard of Elberta variety was almost nothing; in that orchard the sprayed trees gave slightly more fruit per tree than those in the north one.

The statements made above for a particular farm are borne out by the experience of others. In an orchard of 500 trees of the Elberta variety, 8 years planted, near Port Clinton, there was scarcely any fruit left, possibly a bushel in the lot of trees; most other varieties had a better crop.

#### DISTRIBUTION OF LEAF CURL IN 1898 — VARIETIES AFFECTED.

The distinctive prevalence of this disease was more or less limited in its occurrence, the extensive orchards of southeastern Ohio escaping serious injury. But in central and northern Ohio, the low temperature

of April developed an abundance of the disease on susceptible varieties. The reasons back of the phenomenal variations in the amount of damage in the districts mentioned may not at present be stated with clearness; certain it is there was less leaf curl through the southeastern orchards than in 1897.

Certain varieties were generally exempt from injury by this fungus, though few were entirely free from attack. Geary's Hold-on and Smock were scarcely injured in rows adjoining the Elberta badly injured. In some districts the Salway was scarcely attacked, while in others this variety suffered severely.

#### COMMUNICABILITY OF CROWN GALL.

One of the experiments to discover the possible relation between crown gall of the raspberry and that of the peach has been closed. The results appear strongly to support the communicability of the raspberry form of the disease to healthy peach trees.

In April, 1896, 34 healthy, nursery-grown peach trees were set in the raspberry rows of a diseased plantation of Thompson's Prolific, belonging to Mr. S. L. Hill, Berlin Heights, Erie county, the owner kindly coöperating in the undertaking. These raspberry plants were badly affected with crown gall, it was thought in all parts of the area. Various materials were worked into the soil for a foot on either side of the place where the peach tree was to be set. The substances used were Paris green, sulfur, pyrethrum and arsenic. A share of the trees were planted in untreated soil. Two years after setting these peach trees were removed, the raspberry plantation having been plowed up. Several trees were killed by the treatment employed, 27 surviving in 1897 and 25 at the time of the removal. Of the 25 surviving trees 17, or 70.8 per cent. were affected with crown gall on roots or crown in April, 1898. Of those treated and surviving there were three that had been treated with pyrethrum and none sound; 3 that had been treated with sulfur and one sound; 19 that had been untreated and 7 sound. The communicability of the gall disease from these raspberry plants to the peach trees is thus supported, while no support is given to the idea of soil treatment to prevent this, in so far as the substances tried in this experiment are concerned. As a rule, the roots were in better condition in the sulfured soil, the greater number of galls being beyond the area treated, though in other cases the galls were produced in soil which showed plainly the presence of a quantity of flowers of sulfur at the time of removal.

## PEACH YELLOWS PREVALENT IN 1898.

This subject may not be passed if we would; Ohio peach orchards probably suffered more injury in 1898 from yellows than from all other diseases combined. To put it in another way, yellows is now a decided menace to peach growing in Ohio.\* On 80 to 90 per cent. of the trees yet standing in orchards, yellows symptoms are not an uncommon sight in Lake and Athens counties. The people have been slow to be convinced that yellows is dangerous. They have some of them paid the penalty of disbelief. In past seasons I have stated that "yellows" has been a misnomer so far as indicating the true symptoms, which have been distinctly stated in the bulletins, but for the season of 1898 yellow colors have rarely been lacking on affected trees. In the illustration (Plate III) is shown a photographic representation of two seedling peach trees in Athens county fence-corners; the one on the left is healthy, that on the right is in the first stages of yellows. The difference is in the yellow color (not shown of course here) the narrow leaves, often turned back about the twigs, and the premature dropping of the leaves. The photograph was taken September 20. Other orchards showed even greater defoliation of yellows trees on that date. In passing through orchards in southern Ohio, late in September of 1898, the trees affected by yellows could be, for the most part, distinguished by this early defoliation. The symptoms commonly recognized have become well known and are described elsewhere; those of an obscure character, to which allusions have already been made, should usually be recognized in all affected districts. The leaves may not be narrow, and may be but slightly yellowish in color yet show by a peculiar turning back about the twig, or by a wand-like arrangement thereon, that the tree is doomed. Mr. M. C. Sweet, of Kirtland, has long followed these symptoms closely and has saved his orchards fairly well, while others not far distant have been almost destroyed by yellows.

To me, one surprise for the year has been the phenomenal virulence of peach yellows in Ohio orchards. The yellows has shown very much greater virulence than I have ever before known. Outside of the Maumee Valley, where it may not yet occur, and in Ottawa county, where

---

EXPLANATION OF PLATE III.

Plate III. An apparently healthy and a diseased seedling peach tree in Athens county fence corners. The tree on the right is clearly affected with yellows; that on the left is healthy. The diseased tree exhibits a class of symptoms that have been conspicuous during the season just closed; the narrower, yellow leaves, their relation to the twig and the tendency to premature defoliation have all been noticed.

---

\* What follows was presented in substance before the Ohio State Horticultural Society at Euclid, December, 1898.



Plate III. Healthy and Yellows seedling peach trees.

This page intentionally blank.



there is little of the disease, and that closely watched, peach orchards are, in the soberest of judgment, threatened with destruction. This applies to the whole state. A map of localities would show that the distribution of yellows is general in peach growing districts. The proportion of affected trees is diverse, varying from nothing, or very little, to 80 or 90 per cent. of the trees in orchards not past six years old. Parts of Muskingum county, while not exempt, have many orchards almost free from yellows. Coschocton county is worse off than Muskingum, while in Athens county, save alone newer orchards about Amesville, and in Lake county, yellows prevails as a veritable scourge.

If we seek the explanation, it is apparently to be found in the carelessness of orchardists in removing and destroying yellows trees. I think a great many loads of yellows peaches were hauled along the streets of Euclid last season. Marketing yellows fruit and failure to destroy yellows trees may be relied upon surely to spread the disease. When set in yellows-free districts, if trees are transplanted more than two years before the symptoms appear, it would not seem likely that the disease existed in the nursery stock at purchase. On the whole, up to this time, the nursery is very much less guilty in spreading yellows, possible and actual as that source of infection is, than are the orchardists who may fail to use the axe and torch freely. Yellows is communicated by budding, and by proximity of yellows trees, probably by that of yellows fruit. "Gentlemen, I fear that the high-water-mark-peach-crop in Ohio for 1898, amounting probably to 2,500,000 bushels, will not be seen again very soon. The remedy lies in thorough local work and careful purchase of new stock. No one can help you unless you can and will help yourselves."

#### SUMMARY.

The disease known as leaf curl of the peach, due to *Exoascus deformans* B. was very destructive on many varieties of peaches in northern Ohio in 1898.

During the season, further demonstration has been made by peach growers in Ohio of the efficacy of spraying with Bordeaux mixture before the blossom opens, as recommended by this Station, to prevent the injuries of this disease. For this reason, application as early as April 12 has been effective, and there are indications that the first spraying may be successfully made in the fall or in March; but it is not clear that applications of the mixture just before the opening of the blossoms may be safely omitted, even where the earlier one has been made.

Whale oil soap, applied in strength of 1 to 2 pounds per gallon of water as the buds are swelling, has also proven a successful preventive of the leaf curl. Since this material is so much more expensive than Bordeaux mixture and apparently no more effective, its use is not at present

recommended for leaf curl alone. The information obtained is herein presented.

The profits accruing to Ottawa county growers, for 1898, in spraying to prevent leaf curl on the Elberta and other very susceptible varieties, have amounted to \$1.50 to \$2.00 per tree, the trees being seven to nine years of age.

Peach yellows has shown phenomenal virulence in Ohio, especially during the last season. This disease prevails in all the extensive peach growing districts of Ohio except it be in the Maumee Valley. The gradation in the extent of injury is in proportion to the care taken to prevent the spread of yellows. Only prompt destruction of yellows trees can check the extermination of most existing Ohio peach orchards by this disease, within a comparatively short time.

---

#### PUBLICATIONS OF THE OHIO AGRICULTURAL EXPERIMENT STATION.

A complete list of previous publications of this Station may be found in Bulletin 95. Following are the titles of subsequent bulletins:

- No. 96. The Army Worm and other insects; Wheat and Grass Sawflies; the Corn or Boll Worm; the Painted Hickory Borer; the Raspberry Cane Borer; the Peach Scale.
- No. 97. Diseases of wheat and oats.
- No. 98. Small fruits; cultural notes and comparison of varieties.
- No. 99. Sugar beet investigations in 1898.
- No. 100. A comparison of factory-mixed and home-mixed fertilizers.
- No. 101. Experiments with oats.
- No. 102. Soil and seed treatment and spray calendar for insect pests and plant diseases.
- No. 103. The San José Scale in Ohio.
- No. 104. Further studies upon spraying peach trees and upon diseases of the peach.

This page intentionally blank.

This page intentionally blank.